

Hall Köln, Bonn, Hamburg

17.30–19.00

V 45

Fibrotic Tissue Responses

V 45-1

Peritoneal adhesions – evidence of angiogenesis and remodelling

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Introduction: Adhesions form after 95 % of laparotomies and can result in small bowel obstruction, infertility and increased operative difficulty, however little is known about their formation and development. Adhesions are commonly considered to form due to diminished fibrinolysis but little is known as to other processes involved in their development. This study aimed to examine the structure, vasculature and cell proliferation of human peritoneal adhesions. A better understanding of adhesion biology may lead to future therapies.

Methods: Adhesions were collected from 32 patients. Histological features were assessed using a semi-quantitative scoring system. Microvessel density was assessed by immunolocalisation of multiple endothelial markers and confocal microscopy was used to examine the three-dimensional structure of vessels. The presence of VEGF and its receptor was detected by immunohistochemistry. Immunolocalisation of PCNA demonstrated areas of cell division. A comparison was made between omental (n = 16) and non-omental (n = 16) adhesions.

Results: Adhesions were seen to be well vascularised structures comprising bundles of collagen, patches of adipose tissue, fibrin, haemosiderin and inflammatory cells. Adhesions were seen to have blood vessels expressing a range of vascular markers. Adhesion blood vessels formed branching structures and express VEGF and its receptor flk-1. Over 90 % of adhesions showed areas of proliferation. Omental adhesions contained significantly more adipose tissue (p < 0.05), had a higher microvessel density (p < 0.01) and lower cellularity (p < 0.05) but no difference in cell proliferation or other histological features.

Conclusions: Adhesions contain blood vessels with angiogenic potential and show evidence of cell proliferation. Omental adhesions are more vascular and contain more adipose tissue than non-omental adhesions. This study provides strong evidence that adhesions are dynamic, vascular structures not merely inert scar tissue and as such may be targeted by anti-angiogenic agents. Altered fibrinolysis may be necessary for adhesion formation but angiogenesis is also shown to take place in this study.

V 45-2

Scarring and scarless wound healing may be related to variations in the intrinsic ageing profiles of resident fibroblast populations

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Introduction: In contrast to skin wounds, oral mucosal wounds heal rapidly and without scar formation; a difference that might be related to the intrinsic ageing profiles of the resident cell populations. We have investigated, for the first time, the onset of senescence in oral mucosal fibroblasts (OMF) and skin fibroblasts (SF), along with their genotypic and phenotypic characteristics, in an attempt to explain the distinct differences in their wound healing responses.

Methods: Patient-matched OMF and SF were cultured until senescence (determined by telomere length analysis, senescence associated-, galactosidase activity, cellular morphology and analysis of population doubling levels [PDLs]). At early passage (5/6), fibroblasts were synchronised through serum starvation for 48 hours, re-stimulated with serum and RNA extracted at 0, 1, 6 and 24 hours for transcriptional profile analysis (Affymetrix™ Microarrays). Throughout in vitro ageing, the cellular phenotypes were assessed with respect to wound repopulation (automated time-lapse) and extracellular matrix (ECM) reorganisation (and the involvement of matrix metalloproteinases [MMPs]).

Results: Compared to SF, OMF progressed rapidly through the cell-cycle (Flow cytometry: 31 % of OMF vs. 7 % of SF in G2 phase - 6 hours post-stimulation), underwent more population doublings (> 90 vs. 45 in SF) and senesced later. At early passage, OMF also had higher proportion of longer telomeres (p < 0.05; mean telomere length: SF - 4.8 kb; OMF - 8.2 kb). Microarray analysis identified differential regulation of numerous genes between SF and OMF (in OMF: 146 genes > 2-fold; 38 genes > 3-fold; 3 genes > 5-fold). K-means clustering and annotation (Ease 2.2) of the data demonstrated variations in a pathway involving actin/actin-binding protein activity. This was related to the increased ability of OMF to repopulate in vitro monolayer wounds and reorganise their surrounding ECM environment (p < 0.05). Gela-

tin zymography demonstrated increased production of MMPs by OMF, both at early passage ($p < 0.01$) and at senescence ($p < 0.05$).

Conclusions: Distinct differences exist between OMF and SF with respect to their ageing profiles which may explain the distinct genotypes and phenotypes these cells possess. These investigations are revealing more about scarring and scarless wound healing, and may help develop products/treatments aimed to obviate scarring and ameliorate dysfunctional wound healing.

V 45-3

Novel explanation for the role of the dermis in controlling wound contraction, fibrosis and scarring

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Introduction: Scar contracture and fibrosis are an unfortunate result of injuries, particularly when there is skin loss. Skin grafting reduces contraction; although thick grafts are effective, thin grafts give poor results. This means that the dermis is important in reducing contraction. The reason for this is unknown. The aim of this study was to document the effect of extracts of different levels of dermis on the ability of fibroblasts to cause contraction.

Materials and methods: Using the fibroblast in hydrated collagen lattice (FHCL) as a model. Human dermis was split into 3 layers (superficial, middle and deep) by a Padgett's dermatome. Extracts were prepared from each layer using successive solvents (water (extract A), normal saline (extract B), 1M saline (extract C), citrate buffer (extract D) and urea (extract E)). Collagen lattices ($n = 100$) were prepared and seeded with fibroblasts. Each of the extracts (5) from each layer (3) was added to 5 of the lattices and 25 of the FHCLs were used as the control preparation. The degree of contraction of the FHCL was measured daily for 4 days. Flow Cytometry was used to examine the effect of the extract on the fibroblast cell cycle. Fibroblasts migration was measured by using a fibronectin-coated polycarbonate filter in a microchemotaxis chamber (migration assay).

Results: The results showed that the citrate buffer extract (Factor D) was most effective in limiting contraction and that the extract of the deep dermis was more effective than extracts from the middle or superficial dermis [$p < 0.001$ Mann-Whitney test]. The deep dermal extract D (DMF) has a significant effect on fibroblast proliferation by blocking the cell cycle at the S phase p value < 0.01 (Student's t -test). Migration Fibroblast treated with deep dermal extract D was significantly reduced, p value < 0.05 - Student's t -test

Conclusions: The inhibition of contraction by skin grafting is due to substance (s) present in the dermis. The substance (s) can be extracted by citrate buffer, and present in greatest concentration in the deeper layer of the dermis, which affect cell proliferation and migration. The nature of this substance is under investigation.

V 45-4

Endogenous cell seeding for heart valve tissue engineering

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Introduction: Endogenous in vivo cell seeding is proposed as an alternative to in vitro cell seeding. In this study two methods of endogenous seeding were compared.

Methods: Spontaneous endogenous seeding of an acellular crosslinked (photooxidised bovine pericardium) valve construct was compared to intraperitoneally preseeded valve constructs (1 week ($n = 6$) and 1 month ($n = 6$) in each group) in a sheep model of pulmonary valve implantation.

Results: Echocardiography showed normal function in all valves. At explantation all valves were macroscopically intact except for a thrombosed leaflet in 1 group 1 valve at 1 month. Cryosections were immunohistochemically stained (Table 1). The recellularisation was significantly higher in group 2 than group 1: overgrowth was 71 to 100 % of the leaflet versus 8 to 26 % ($p < 0.05$) respectively. Neomatrix deposition, present in both groups, was 10-fold higher in group 2 versus group 1 ($p < 0.05$). The leaflets

Table 1 - V 45-4.

	Control 1 week	1 month	IP-Preseeded 1 week	1 month
CD44+ cells (%)	4.8 [1.4, 13.3]	17.0 [8.4, 32.8] #	4.6 [2.0, 8.2]	8.4 [0, 15.7]
CD45+ cells (%)	4.2 [2.1, 9.5]	5.3 [1.1, 14.1]	11.1 [4, 17.7]	5.8 [4.4, 17.5]
CD172a+ cells (%)	26.1 [0, 50.5]	31.2 [4.7, 83.8]	16.4 [10.4, 25]	10.4 [6.7, 23.7]
CD34+ cells (%)	0 [0, 1.2]	1.7 [0, 7]	1.1 [0, 5.3]	1.4 [0, 3.3]
ASMA+ cells (%)	4.8 [1.2, 14.1]	33.1 [2, 47.4]	34.1 [2.1, 65.8]#	42.7 [6, 66.7]
VIM+ cells (%)	18.7 [11.8, 29.1]	86.8 [32.4, 93.4]	59.5 [12.2, 91.3]	54.2 [30, 78.1]
SMMS+ cells (%)	0 [0, 1.8]	0.1 [0, 0.9]	0 [0, 0]	1.8 [0, 9.9]
ecNOS	1/6	3/6	5/6*	6/6

of group 2 are twice as thick as the leaflets of group 1 ($p < 0.05$). Additionally significant decrease in leaflet length (15 %) was found at one month in group 2. The total cross-sectional surface and total amount of collagen (picosirius red staining) of the original photooxidised pericardium in the leaflet remained unchanged in both groups at all times.

Conclusions: Our result show that endogenous seeding of an acellularised cross-linked matrix occurs spontaneously but remains incomplete. However, complete recellularisation can be obtained by intraperitoneal preseeding of such a matrix. Well functioning valve constructs show the cellularisation and differentiation to the myofibroblast phenotype and concomitant neo-matrix deposition.

V 45-5

Foreign body reaction induced stem cell seeding of matrix material for the construction of a tissue engineered heart valve

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Introduction: The majority of heart valve tissue engineering (TE) techniques is based upon in vitro seeding of matrix materials, which is associated with considerable disadvantages. An alternative in vivo seeding of vascular grafts, by means of intraperitoneal (IP) implantation of a non degradable matrix and induction of a foreign body reaction (FBR) during 2 weeks, was proposed by Campbell et al., 1999. In our previous study in sheep, we used an IP seeding procedure of heart valves, based upon an immature stage (3 days) of the FBR. Recellularisation was proven to be significantly better than in the non IP seeded counterparts.

Methods: This study in rats unravels the cellular dynamics and assesses macrophage attraction, immune response, proliferation, differentiation and stem cell attraction during the immature stages of the FBR, 6 hours, 1, 2, 3 and 7 days after IP implantation of an acellular photo-oxidised bovine pericardium patch. Markers used are CD68 (macrophages), CD45 (leukocytes), CD3 (T-lymphocytes), CD72 (B-lymphocytes), CD243 (2/3 monocytes, 1/3 granulocytes, haematopoietic stem cell subset), vimentin (mesenchymal cells), alpha smooth muscle actin (myofibroblasts, smooth muscle cells), heavy chain myosin (smooth muscle cells), CD90 (stem cell subset, stromal cells), CD105 (mesenchymal stem cells, stromal cells), Stro-1 (bone marrow

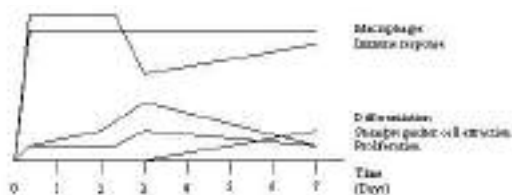


Figure 1 - V 45-5: Results – Cellular dynamics during immature FBR. (The lines in the graph aren't strictly relative to each other)

stromal cell precursors), CD34 (haematopoietic progenitor cells), Sca-1 (multipotent haematopoietic stem cells), CD117 (progenitor cells), CD133 (primitive stem cells) and Ki67 (proliferating cells).

Conclusions: Macrophages are constantly present in the implant material. Especially at 3 days after implantation, markers concerning immune response show a significant dip, differentiation into myofibroblasts starts and cell proliferation reaches its maximum of 4.1 [2.1, 10.4] %. Stem and progenitor cells were also detected, with a significant peak at day 3. Our data therefore suggest the importance of stem and progenitor cells during these immature stages of the FBR and are the basis for further research concerning new recellularisation techniques in the field of TE.

V 45-6

Thermal injury leads to caspase 3 and PARP induction in burn wounds

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Introduction: Prolonged tissue damage in burn wounds leads to deepening of the burn wound with subsequent worsening. Previous studies have demonstrated that environmental stress can effect the cell cycle and oncological studies have shown that apoptosis plays an important role in heat-induced cell stress. In order to get more insight in the mechanisms of cell death in the skin we examined cell proliferation and apoptotic pathways in vivo and in vitro.

Methods: Tissue sections of debrided burn wounds of various days postburn were stained for TUNEL, polyADPibose, p53, p21, active caspase 3, and Ki-67 by immunohistochemistry. Furthermore we analyzed the colony forming efficacy and sequential and differential cell death of human primary keratinocytes after thermal stress in vitro. Western blots for p21 and p53 were also performed.

Results: In vivo we could demonstrate that burn wounds show a reduced mitotic index as compared to split thickness grafted wounds. A strong active caspase 3 and Poly-ADP ribose immunoreactivity was seen at the wound edge. TUNEL positive cells indicating apoptosis were seen in the tissue sections. In vitro a prolonged and temperature dependant decrease in colony forming efficiency was observed. At moderate temperatures in vitro cell death was due to apoptotic cell death accompanied by immunoreactivity for p21 and p53.

Conclusions: Thermal trauma leads to apoptotic cell death in keratinocyte of the burn wound possibly by activation of caspase 3. Therefore antiapoptotic strategies may influence burn wound healing.

Hall Maritim

17.30–19.00

V 46

Klinische Fallstricke – Besonderheiten in der Praxis

V 46-1

**Surgical treatment of acne inversa
(alias Hydradenitis suppurativa)****Die chirurgische Behandlung der Akne
inversa (alias Hydradenitis suppurativa)**R. Hierner¹, H. Degreef²¹Plastische, Rekonstruktive und Ästhetische Chirurgie Universitätsklinikum Gasthuisberg, Katholische Universität Leuven, Leuven, Belgium,²Dermatologie, Universitätsklinikum St. Raphael, Katholische Universität Leuven, Leuven, Belgium

Introduction: Acne inversa (alias Hydradenitis suppurativa) is a rare chronic and recurrent suppurative inflammatory skin disease, which involves the follicular epithelium and sweat glands. This disease is characterized by giant comedones, papules, nodules, abscesses, fistulas and extensive draining sinuses with scar formation. The areas affected in this disease are skinfolds which carry terminal hair follicles and apocrine sweat glands such as the axillae, groins, perineum and the anal fold, but also the infra mammary fold, the buttocks, the scalp and nape of the neck. One or more areas can be affected at the same time. Left un-treated this disease leads to extensive scarring, with dermal contraction and limitation of mobility, and to social isolation due to embarrassing loss of purulent secretions. Complications in the long term are (as already mentioned) dermal scarring, anaemia, thrombocytopenia, streptococcal invasion which can lead to sepsis and death, arthritis, systemic amyloidosis and malignant transformation to squamous cell carcinoma.

Material and method: In a retrospective clinical study 50 (2 × scalp, 31 × axilla, 2 × abdomen, 15 × inguinal/perineal) patients with severe acne inversa were seen on our multidisciplinary wound consultation and operated after complete conventional treatment. There were 12 male and 38 female patient. The age ranged from 19 to 53 years. In a retrospective clinical study the following criteria were evaluated: 1) wound healing, 2) subjective patient satisfaction, and 3) complications.

Results: After resection the defect could be closed primarily in all cases with inguinal involvement. For defect coverage at the axilla local flaps (Limberg, Parascapular flap) were used. Scalp defects were covered with a split thickness skin graft. Complete wound closure could be achieved in all patients. In 6 patient recurrent infection occurred at a distant site, however in much

lower intensity. There was high patient satisfaction and excellent postoperative compliance. There were 2 impaired wound healing. One case needed secondary operation, the other healed by secondary intention within 6 weeks.

Discussion: Treatment of severe acne inversa is best done in a multidisciplinary approach. We done emphasize the necessity of a complete dermatological treatment prior and after operation.

Einleitung: Acne inversa (alias Hydradenitis suppurativa) bezeichnet eine seltene chronisch rezidivierende entzündliche Hauterkrankung, welche vom follikulären Epithelium der apokrinen Schweißdrüsen ihren Ursprung nimmt. Das Krankheitsbild ist gekennzeichnet durch große Comedo, Pappeln, Noduli, Abszessen, Fistelgängen und schließlich Narbenplatten. Prädelektionsstellen sind Axilla, Submammärfalte, Leiste, perianale Region und die Nackengegend.

Material und Methode: In einer retrospektiven klinischen Studie wurden 50 Patienten der interdisziplinären dermatoplastischen Sprechstunde mit chirurgischer Therapie bei ausgeprägter Akne inversa (2 × Skalp, 31 × Axilla, 2 × Abdomen, 15 × inguinal/perineal) nachuntersucht. Es handelte sich um 38 Frauen und 12 Männer. Im Alter von 19–53 Jahren. Untersuchungskriterien waren: 1) Wundheilung, 2) subjektive Patientenzufriedenheit und 3) Art und Anzahl von Komplikationen.

Ergebnisse: Ein primärer Wundschluss war bei 42 von 50 Patienten möglich. Im Skalpbereich erfolgte ein mehrzeitiges Verfahren mit Resektion, Wundkonditionierung und sekundärer Spalthautplastik. Nach operativer Therapie bestand eine hohe Patientenzufriedenheit. Eine verzögerte Wundheilung (Wundheilung > 3 Wochen) trat bei 8 Patienten auf, wobei bei 2 ein erneuter operativer Eingriff notwendig wurde. Bei 6 von 50 Patienten trat im Zeitraum 1 Jahr postoperative eine erneute Entzündung im Rand des Operationsgebiet auf. Im Bereich der Axilla lag bei keinem Patient ein Rezidiv vor.

Schlussfolgerungen: Für die Therapie der schweren Form der Acne inversa hat sich eine interdisziplinäre Therapie bewährt. Eine dermatologischen Basistherapie ist empfehlenswert. Durch die chirurgische Resektion großer narbig veränderter Gewebeflächen und deren Ersatz durch gut durchblutetes Gewebe – oft mit geringerer Anzahl an apokrinen Schweißdrüsen – erhöht sich Wirkungsgrad und Effektivität der systemischen konservativen Therapie. Im Gegensatz zur gängigen Lehrmeinung können Defekte nach Resektion primär mithilfe einer Lappenplastik verschlossen und müssen nicht der monatelangen Sekundärheilung überlassen werden.

V 46-2

Behandlung von Paravasaten im Bereich der oberen Extremität

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Einleitung: Die akzidentelle paravenöse Infusion von Lösungen und/oder Medikamenten im subkutanen Gewebe stellt ein oft unterschätztes Problem dar, vor allem beim sedierten Patienten. In Abhängigkeit von Volumen und Art der Substanz können alle Bilder von Spontanregeneration ad integrum bis zum allschichtigem Gewebedefekt der Haut und eventuell darunterliegender Strukturen resultieren.

Material und Methode: In einer retrospektiven klinischen Studie wurden 60 Patienten, die durch unseren plastisch-chirurgischen Konsiliardienst gesehen wurden, nachuntersucht. Es handelte sich um 32 Frauen und 28 Männer, im Alter von 6w – 92 Jahren. Untersuchungskriterien waren:

- 1) Art des Paravasats,
- 2) Zeitpunkt zwischen Paravasat und erster Behandlung,
- 3) Art der Behandlung,
- 4) Wundheilung und
- 5) Art und Anzahl von Komplikationen.

Ergebnisse: Bei 46 Patienten kam es zu einem Paravasat mit physiologischer Kochsalzlösung; In 14 Patienten bestand ein Paravasat mit Epirubizin oder Adriamycin. Die durchschnittliche Dauer zwischen Paravasat und erster plastisch-chirurgischer Behandlung betrug 7 (1–86) Tage. Nach Paravasat mit Kochsalz konnten bei 28 Patienten eine Spontanheilung ohne Funktionsverlust abgewartet werden. Bei 14 Patienten trat nach Spontanheilung eine partielle Hautnekrose auf, die entfernt und mithilfe einer Spalthauttransplantation geschlossen wurde. In 4 Fällen erfolgte eine Druckentlastung durch Liposuktion bei Patienten, die früh gesehen wurden und entweder eine protrahierte Hautschämie oder Anzeichen eines Kompartmentsyndroms zeigten. Bei den Patienten mit Paravasat nach Chemotherapie erfolgte in jedem Fall ein Debridement. Der resultierende Defekt wurde mithilfe einer lokalen Lappenplastik (n = 9) oder einem Spalthauttransplantat (n = 5) gedeckt. Eine primäre Wundheilung konnte bei 52 Patienten erreicht werden. Bei 8 Patienten trat eine verzögerte Wundheilung auf, meist durch sekundäre Nekrose im Wundrandbereich, weshalb eine sekundäre Spalthauttransplantation durchgeführt werden musste.

Schlussfolgerungen: Die Prävention von Paravasaten vor allem mit Chemotherapeutika ist von größter Bedeutung. Durch die großzügigere Indikationsstellung für Portsysteme konnte die Anzahl an schweren Gewebedefekten nach Extravasation von Chemotherapeutika deutlich gesenkt werden. Für die Therapie der Paravasate hat sich eine interdisziplinäre Therapie bewährt. Primär muss die Infusion gestoppt werden, der Zugang sollte – wenn nicht infiziert – in situ belassen, und die betroffene Extremität hochgelagert werden. Die Gabe eines Antidots hat keine bewiesenen Vorteile und verschlechtert die Gewebepfusion zusätzlich. Abhängig von Art und Menge der paravenös gelassenen Substanz und dem Zeitpunkt der Ersttherapie stehen mehrere Behandlungsmöglichkeiten zu Verfügung.

V 46-3

Indikationen und Ergebnisse der Hauttransplantation bei chronischen Wunden: Das „dermato-plastische Therapiekonzept“

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Einleitung: Im Kontext der Therapie chronischer Wunden kann die Hauttransplantation als unterstützende Maßnahme der Epithelialisierung des Wundgrundes angesehen werden. Wundschluss bedeutet Infektionsprophylaxe und verminderter Verlust von Körperflüssigkeit. Für den klinischen Gebrauch hat sich die Einteilung der Hauttransplantate in Abhängigkeit von der Transplantatdicke (Spalthaut/Vollhaut), Geometrie (Punch, Meshn Sheat), Art (Eigen/Fremd), Natur (biologisch/artifiziell) und Transplantationstechnik bewährt.

Material und Methode: In einer retrospektiven klinischen Studie wurden 50 Patienten der interdisziplinären dermato-plastischen Sprechstunde mit Hauttransplantation bei Ulcus cruris nachuntersucht. Es handelte sich um 36 Frauen und 14 Männer. Im Alter von 47–92 Jahren. Untersuchungskriterien waren:

- 1) Art und Anzahl von operativen Eingriffen,
- 2) Wundheilung,
- 3) Art und Anzahl von Komplikationen,
- 4) Erneutes Auftreten eines Ulcus cruris im Operationsgebiet und
- 5) subjektive Patientenzufriedenheit.

Ergebnisse: Insgesamt wurden 117 operative Eingriffe durchgeführt (69 Wundbettconditionierung, 56 autologe Hauttransplantationen, 2 Unterschenkelamputationen). Bei 30 Patienten konnte eine primäre, bei 14 Patienten eine subtotale und bei 4 Patienten eine partielle Wundheilung erzielt werden. Bei 4 Patienten trat im Spendergebiet eine behandlungsbedürftige Infektion auf. Im Empfängergebiet kam es bei 2 Patienten zu einer Nachblutung und bei 6 Patienten zu einer Infektion. Nach kompletter Abheilung des Ulcus trat ein Rezidiv im Operationsgebiet nach einem Jahr bei 11 und nach 2 Jahren bei 26 Patienten auf. Die subjektive Patientenzufriedenheit wurde von 18 Patienten mit sehr gut, 17 mit gut, 11 mit befriedigend und 4 mit schlecht angegeben.

Schlussfolgerungen: Autologe und allogene Hauttransplantate können erfolgreich bei der Behandlung chronischer Wunden im Unterschenkelbereich eingesetzt werden. Erfolgt die Behandlung im Rahmen einer interdisziplinären Versorgung, können Komplikationen bei der Transplantatentnahme und fixierung, sowie der Wundbettconditionierung, Nachbehandlung und Prävention deutlich verringert werden.

V 46-4

Behandlung therapieresistenter Wunden mit einem neuen Proteaseninhibitor*W. Tigges¹, F. Rosch¹, U. Clever², E. Schäfer³*¹Asklepios Westklinikum Hamburg, Hamburg, Germany,²Diabetologische Schwerpunktpraxis, Hamburg-Blankenese, Germany³Chirurgische Praxis, Hamburg-Harburg, Germany

Ziel: Trotz aller Fortschritte der modernen Wundtherapie bleiben chronische Wunden problemorientiert und führen nicht in allen Fällen zur Abheilung. Therapieresistente Wunden, bei denen die Ursache abgeklärt und kausal z. B. durch eine Gefäßrevaskularisierung behandelt und bei denen nach den Standards der modernen Wundtherapie die Wundbehandlung durchgeführt wurden, bleiben dennoch keine Seltenheit. Es gibt inzwischen Produkte der modernen Wundversorgung, die über eine direkte Beeinflussung von Matrixmetalloproteasen verfügen sollen. Ziel unserer Anwendungsbeobachtung war nachzuweisen, ob diese Produkte eine Beschleunigung der Wundheilung erzielen.

Methode: Einbezogen in die Anwendungsbeobachtung wurden bislang 6 Patienten, bei denen trotz kausaler Therapie und Anwendung moderner Wundversorgung keine Heilungstendenz verzeichnet werden konnte. Bis zum Einsatz des die Matrixmetalloproteasen beeinflussenden Produktes (es enthält bioaktive Spurenelemente, die nach einem patentierten Verfahren aus Eichenrinde extrahiert werden) bestanden diese Wunden über einen Zeitraum von 6 Wochen bis zu einem halben Jahr. Die Wundaufgabe wurde in zweitägigem Abstand appliziert und wöchentlich fotodokumentiert.

Ergebnisse: Erste Ergebnisse nach Anwendung von sechs Wochen zeigen eine gute Entwicklung chronischer, bislang therapieresistenter Wunden. Sogenannte „Therapieversager“ traten bei unserem Patientengut nicht auf. Bei allen Patienten konnte eine mindestens 50 %-ige Verkleinerung der Wundfläche erzielt werden; bei zwei Patienten innerhalb von sechs Wochen eine 50 %-ige Reduktion der Wundfläche. Bei zwei Patienten betrug diese Reduktion 70 %, bei einer Patientin 90 %; bei einem Patienten kam es nach 5-wöchiger Anwendung zu einer vollständigen Abheilung.

Diskussion: Die normale Wundheilung erfordert neben synthetisierenden Prozessen auch abbauende Mechanismen, die in einem Gleichgewicht zueinander stehen müssen. Unter den abbauenden Enzymen wie Proteasen haben die Matrixmetalloproteinasen (MMP) die wichtigste Bedeutung. MMP bauen Matrixproteine ab (insbesondere neu gebildetes Kollagen) und können ihrerseits wiederum Wachstumsfaktoren deaktivieren. Klinisch wie experimentell scheint eine Verzögerung oder Hemmung der Wundheilung mit einem Überschuss an Matrixmetalloproteinasen und ein Mangel ihrer Inhibitoren vorzuliegen. Inzwischen gibt es Produkte der modernen Wundversorgung, die über eine direkte Beeinflussung von Matrixmetalloproteasen verfügen. Die Versorgung von Problemwunden sollte innerhalb eines Netzwerkes der integrierten Versorgung durchgeführt werden, in dem eine komplette Diagnostik und Therapie durch Spezialisten (Gefäßchirurgen, Angiologen, Diabetologen, Podologen) erfolgt. Die Behandlung muss sich dabei an standardi-

sierten Therapierichtlinien orientieren, wie sie z. B. vom Wundzentrum Hamburg e. V. und Netzwerk Diabetischer Fuß Hamburg erarbeitet wurden.

V 46-5

Tumorproblemwunden-Behandlung mittels V.A.C.-Therapie zur perioperativen Strahlentherapie mit aufgeschobener plastisch-chirurgischer Lappendeckung - eine neue Therapiemodalität*R. E. Horch¹, J. Kopp²*¹University of Erlangen-Nürnberg, Department of Plastic and Hand Surgery, Erlangen, Germany,²Department of Plastic and Hand Surgery, University of Erlangen-Nürnberg, Erlangen, Germany

Ziel: Exulzerierte Weichteiltumoren stellen extrem schwierig zu behandelnde Problemwunden dar. Besonders wenn bereits eine Strahlentherapie vorangegangen ist, können Rezidivweichteiltumoren durch ihre Ausdehnung und die Lokalisation oftmals nicht mehr einer kompletten (R0)-Resektion zugeführt werden und bedürfen einer adjuvanten Behandlung. Um radiotherapeutische Strategien bei der Behandlung invasiv wachsender Weichgewebetumoren zu vereinfachen und zu verbessern wurde die gemeinsame Anwendung von Brachytherapie und temporärer kontinuierlicher Vakuumversiegelung mit der Technik der chirurgischen Lappenpräkonditionierung kombiniert.

Patienten und Methodik: Vier Patienten mit fortgeschrittenen Rezidivtumoren in der Leistenregion oder gluteal, bei denen als chirurgische Therapiealternative lediglich eine Hemipelvektomie infrage gekommen wäre, und die eine solche Operation ablehnten, wurden so radikal wie möglich reseziert. Nachfolgend wurden Brachytherapie-Röhren direkt auf das Tumorbett implantiert und mit einer V.A.C.[®] Therapieeinheit (KCI, Wiesbaden) mit -125 mmHg versiegelt. Zur gleichen Zeit erfolgte die Umschneidung und Anhebung eines benachbarten Weichgewebsareales zur Präkonditionierung und späteren Defektdeckung. Brachytherapie und externe Bestrahlung wurden direkt unter oder auf dem Schwamm-gedeckten Areal appliziert. Nachfolgend erfolgte die Defektdeckung mit den präkonditionierten Weichgewebelappen.

Ergebnisse: Die Exzisionen reduzierten die jeweilige Tumormasse erheblich und resultierten in einem Fall in einer deutlichen Verbesserung von Motorik und Sensibilität an der betroffenen Extremität. Die Vakuumversiegelung erlaubte wiederholte Brachytherapien und externe Bestrahlungen nach exakter Platzierung der Röhren und FLABS auf dem jeweiligen Tumorbett. Die wiederholte Radiatio hatte keinen Effekt auf die benachbarten, präkonditionierten Lappengewebe, welche nach Einschwenken in den jeweiligen Defekt ohne Störung einheilten. Bei einer Patientin konnte wegen eines Rezidivtumors eine erneute konventionelle Radiatio mit der Folge einer bislang anhaltenden und Tumorreduktion und klinischer Beschwerdefreiheit durchgeführt werden.

Schlussfolgerung: Die Kombination von Vakuum- und Brachytherapie kann effektiv die umständliche und aufwendige Anwendung einer intraoperativen Bestrahlung (IORT) ersetzen. Die exakte Platzierung der Bestrahlungsröhren ohne nachfolgende Defektdeckung schont das präkonditionierte Lappengewebe welches am Ende der Radiotherapie zur Defektdeckung in den Tumorddefekt eingeschwenkt wird. Da eine Strahlenexposition dieser Gewebe umgangen wird, kann eine später erforderliche Bestrahlung durchgeführt werden ohne die Lappengewebe dabei zu gefährden. Sowohl für die hier beschriebene Form der sog. Brachytherapie als auch für die konventionelle Bestrahlung durch den Vakuumverband hindurch eignet sich die Methode als schonende und erfolgversprechende Therapieoption in fortgeschrittenen Fällen.

V 46-6

Kontaktsensibilisierungen bei Patienten mit Ulcus cruris: Resultate einer prospektive Studie mit 51 Patienten

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Es ist bekannt, dass Patienten mit Ulcus cruris häufig klinisch relevante Kontaktsensibilisierungen entwickeln. Wir untersuchten prospektiv die Kontaktsensibilisierungsrate von Patienten 51 mit Ulcus cruris hinsichtlich Sensibilisierungen gegen häufig verwendete Externa und Wundauflagen. Wir konnten Kontaktsensibilisierungen gegen PVP-Jod bei 9 (17,6 %) Patienten, Perubalsam bei 8 (15,7 %) Patienten, Kolophonium und Duftstoff-Mix bei jeweils 5 (9,8 %) und Kaliumdichromat bei 4 (7,8 %) Patienten objektivieren. Kontaktsensibilisierungen gegen moderne Wundverbandstoffe fanden wir bei 5 (9,8 %) Patienten gegen Varihesive[®], bei 3 (5,9 %) Patienten gegen Iru-xol[®] N Salbe und gegen Comfeel[®] bei einem (1,9 %) Patienten. In Varihesive[®] konnten wir Kolophonium als das relevante Allergen identifizieren. Unsere Ergebnisse zeigen das aktuelle Spektrum der Kontaktsensibilisierungen von Patienten mit Ulcus cruris. Als eine Konsequenz, die sich aus den aktuellen Resultaten ergibt, sollte in Zukunft bei Patienten mit einem Ulcus cruris verstärkt auch auf die Inhaltsstoffe moderner Wundtherapeutika geachtet werden. Insbesondere der Einsatz von PVP-Jod erscheint äußerst bedenklich zu sein. Wir empfehlen daher bei allen Patienten mit chronischen Wunden Epikutantestungen durchzuführen und identifizierte Allergene strikt zu meiden.

TR 4.4. 25-27

17.30–19.00

V 47

Education and Implementation of Care

V 47-1

Braden scale: a pathway to the quality of care

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Aims: Pressure sores are a public health problem. However, in Portugal, perhaps due to the lack of available data, this evidence is not yet recognized by all. There is no impact on better work conditions and more and better prepared health care professionals and materials. In 2002, the Institute of Quality in Health, with the support of the Portuguese Research Group on Pressure Sores, implemented a project aimed at delivering better quality of care to hospital inpatients, through the prevention of pressure sores and the validation and implementation of Braden Scale. This is a 3-year project and it is supposed to reach 130,000 patients during the study. It includes 8 hospitals from medium dimension to central and has been supported, on the field, by 3,000 nurses, 10 % of the total number of Portuguese nurses.

Methods: Formal teaching about the Braden Scale and about the ways to prevent pressure sores was given to two nurses from each hospital ward. These nurses were then responsible for teaching all the nurses in the same ward. Moreover, the nurses who had received lectures from the main investigators, had also to create guidelines about prevention of pressure sores, to be applied together with the Braden Scale. Prevalence and incidence studies were performed in all hospitals in order to evaluate the efficacy of the measures applied. Also, in each hospital, follow-ups were performed for testing inter- and intra reliability.

Results: Until now, more than 30 thousands of patients were collected for incidence studies and more than 3,000 patients for the prevalence studies. For the first time, it was already possible to obtain the mean prevalence and mean incidence of pressure sores in Portugal: 13.6 % for the incidence and 5.6 % for the prevalence.

Conclusions: This project is an excellent contribution to achieve standards of quality of care and better use of health care professionals, as well as in the reduction of hospital stay. It is a means to obtain better cost-effectiveness studies about materials used on the prevention of pressure sores. This is also a way to achieve better quality of care and to reduce the quality of life burden on patients.

V 47-2

Embracing clinical supervision in a network of tissue viability nurses within the rural area of North Wales

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Aim: Clinical supervision brings practitioners and skilled supervisors together to reflect on practice. Supervision aims to identify solutions to problems, improve practice and increase understanding of professional issues. Clinical supervision is seen as part of the clinical governance framework in all practice areas. Each nurse has the responsibility for ensuring they participate in clinical supervision so as to reflect on practice, identify their professional and development requirements and maintain a personal record. The aim of the group was to develop clinical supervision in order to support and improve practice within the speciality of Tissue Viability. The group consists of seven Clinical Nurse Specialists at varying levels of expertise working in North Wales. North Wales is a sparsely populated rural area. Within the area there are three combined community and acute NHS Trusts working with six local health boards.

Methods: The group was developed initially to support each other within the speciality. It was decided to formalise and build on existing practice, in the light of the development of clinical supervision within the NHS and the changing and developing needs of the group. The group meets between four to six times a year of which at least two occasions are for clinical supervision. These clinical supervision times have clear objectives, which meet organisational requirement. Key members of the group have previously undergone preparation to enable them to facilitate and provide clinical supervision.

Discussion: The benefits of developing clinical supervision for the group have been:

- Improvement in the delivery of quality clinical nursing practice.
- Development of seamless Tissue Viability practice and policy development throughout North Wales.
- The reduction of stress due to the professional and personal support and development.
- Improved job satisfaction and motivation.

Conclusions: In an environment where the government are seeking to retain experienced nurses in the clinical environment, this model demonstrates that within the speciality of Tissue Viability, developing clinical supervision has enabled the group to improve their self-esteem and their desire to remain in the speciality with the added bonus of improved patient care.

V 47-3

Impact of wound management education – survey for graduated nurses

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The aim of study was to define the impact of wound management education of Mikkeli and Oulu Polytechnic. The data were collected by survey from nurses who had finished the wound management education until august 2004 (N= 137). The survey included 40 structured questions in multiple-choice or likert-scale concerning professional background and experience, benefit of education and content of current work in wound management. The data were collected through internet in September 2004 and analysed by SPSS 11,5. The questionnaire was answered by 72 nurses, most of them working in South of Finland. The average age of nurses was 42. They worked in primary health care (34), specialised health care (30) and in social sector (8). 54 of nurses were working as a Tissue Viability Nurse, and 47 of them reported the main reason for a post of TVN the wound management education. 46 of nurses reported that they cared wound patients every day. The content of work in wound management was defined by the roles of nurse specialist;

- 1) direct nursing care,
- 2) education,
- 3) consulting and
- 4) research-development activities.

The direct nursing care including planning, implementing and evaluating of wound management had the main role in the content of work. Important tasks were planning of asepsis working, observing, assessing and documenting of wound healing. Supervision of wound patient was reported to be an important part of work by 43 nurses. The roles of educator and consult in wound management were also reported; 56 of nurses worked as a consult and 44 nurses educate other health professionals in wound management. The role of researcher and developer in wound management was also reported: 46 nurses took part in development of instructions in wound management and 31 nurses organised and planned clinical testing of wound management products. The nurses were asked to assess the benefit of wound management education for their work. The benefit got mean 4,3 (scale 1-5). Nurses reported also economical impact of the studies, while 12 of nurses had got extra salary. According to the results of survey the wound management education has impact to nurses work content and professional career.

V 47-4

Development of the burn unit

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Aim: After Lithuania restored its independence from Soviet Union in 1990, reformation of National Medical System and refund of medical expenses changed the situation in the Unit of Burns, requiring to work cost effective and more intensive, seeking for additional activity. In this presentation we share our experience of running the burn unit in the situation of considerable changes. Purpose of the presentation is to report experience of Burn Unit reorganization into Unit of Plastic Surgery and Burns.

Methods and results: After 1990, when independence of Lithuania was restored, reform of National Medical System started. The pick was pointed on cost effective medical practice, thus reducing the number of in-patients and duration of in-hospital treatment. Following the rapid crisis of industry, number of burns in Lithuania in the recent decade decreased from 12 to 7 thousands per year. Although the number of in-patients stays at the level of 2000 cases per year, most of them suffer minor injuries and require short treatment. The duration of treatment also was shortened by modern methods of early excision and grafting. The necessity to continue the operation of sole Burn Unit (National Burn Center) and to sustain work places for staff required to seek for additional similar activity. The choice was made on Plastic, Reconstructive and Hand surgery. The high qualified in Surgery of Burns staff, reinforced with four plastic surgeons started to run new activities. Patients with soft tissue tumors, pressure sores, venous and arterial trophic ulcers and various soft tissue defects were started to treat in the Unit. Besides this acute and orthopedic Hand Surgery activities evolved. The number of patients increased from 430 in 1992 to 1329 in 2002. Improved situation resulted in higher possibilities to increase sponsorship of treatment of burns.

Conclusions: In the situation of considerable drop of number of burn injuries, the unit specialized in the treatment of burns can develop the additional activity. This preferably may be similar field of surgery. This decision allows to continue activity of the unit and to keep (save) work places for qualified staff.

V 47-5

Towards a framework of lymphoedema management: Assessing the educational needs of community nurses

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Introduction: A key aspect of a major initiative to introduce and evaluate a framework of lymphoedema management in a primary care trust (PCT) setting in London, UK, is the education of community (home care) nurses.

Aim: The aim of this study was to assess the educational needs of community nurses regarding the care of people with lymphoedema.

Methods: The first stage of a four stage model of educational needs assessment involved a self-selecting sample of community nurses drawn from one primary care trust. Data were collected using scenario-based focus groups to capture their real-world experience of caring for people with lymphoedema and structured questionnaires which required a self evaluation of their knowledge and skills in this area of practice.

Results: Eight focus groups were held with 54 community nurses attending one focus group each. All those attending also completed a questionnaire. From the focus group data, three themes were identified: concern about levels of knowledge and skill, role uncertainty and lymphoedema is a nursing problem. Questionnaire responses indicated that in only one category, skin care, did a small majority of community nurses (54 %) judge themselves to have excellent or good knowledge and skill. In the remaining 10 categories the majority scored their knowledge and skill as adequate or poor.

Discussion: Community nurses are concerned about their lack of knowledge and skill in the care of people with lymphoedema. This lack of knowledge and skill is often compounded by uncertainty about their role in relation to other health care professionals involved in the care of this patient group. At the same time community nurses understood the important place nurses in a community setting have in providing ongoing care, recognising problems, offering advice and information and referring on to a specialist practitioner when necessary. Any educational provision that prepares community nurses for their role within a framework of lymphoedema management should emphasise the important place they occupy in providing long-term care for people with lymphoedema.

V 47-6

Education on wound management in Portugal – results of a survey in health institutions

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Introduction: GAIF (Grupo Associativo de Investigação em Feridas) has established has one of his main objectives, the promotion of education in wound management, at all levels (pre and post graduation) in nursing, medical and pharmacy schools.

Aim: Assess the scope of educational interest and expectations in wound management at the pre-graduation level in health education institutions in Portugal.

Material and methods: We have devised a self administered questionnaire which was posted to all education Institutions. The questionnaires contained 4 main parts: characterisation of the school, data related to staff responsible for the wound subject; contents and duration of subject in wound management and final considerations.

Results: Of the 27 questionnaires, 21 were returned (79%) of which 19 were from nursing schools and 2 from pharmacy schools. Medicine schools didn't answer. The number of teachers involved in the subject of wound management varied from 1 to 4 and some institutions (5) invited external experts and attended workshops and seminars promoted by national association dedicated to the theme. Only 2 nursing schools had on going research on the field of wound management, with one paper published. The number of hours dedicated to the subject varied from 0 to 18 in nursing schools and from 1 to 2 in pharmacy schools. The main subtopics addressed were pressure ulcers, leg ulcers and diabetic foot. Burns and malignant wounds were less approached. 15 of 19 nursing schools considered that the time allocated to wound management was insufficient and 14 mentioned that the speciality of tissue viability in nursing should be introduced.

Conclusions: We concluded that education supplied by nursing and pharmacy schools on wounds management was insufficient although it was not possible to assess its quality. Most schools are willing to establish partnership with GAIF in order to improve.